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Document Control Desk
U.S. NUCLEAR REGULATORY COMMISSION
Mail Station P1-137
Washington, D.C. 20555

Ladies/Gentlemen:

DOCKET NO. 50-266
LICENSEE EVENT REPORT 266/2000-001-01
MANUAL REACTOR TRIP DUE TO DECREASING
CIRCULATING WATER FORE BAY LEVEL
POINT BEACH NUCLEAR PLANT UNIT 1

Enclosed is Licensee Event Report 266/2000-001-01 for the Point Beach Nuclear Plant Unit 1. This report is provided in accordance with 10 CFR 50.73(a)(2)(iv) as, "any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." This report documents the procedurally directed manual trip of the reactor from approximately 41% power as a result of loss of level control of the circulating water (CW) system due to freezing conditions in the CW intake structure. This report replaces the original LER which was submitted on February 21, 2000, and corrects several statements in the event narrative regarding the RCS temperature and pressurizer level transients following this event. Changes to the original LER have been indicated with margin bars.

Immediate corrective actions have been completed and are discussed in this report. Additional corrective actions have been identified by the incident investigation team which completed a comprehensive root cause evaluation of this event on February 29, 2000. These corrective actions have been assigned to appropriate plant groups and will be managed within the PBNP corrective action program. No new NRC commitments are identified in this report.

Please contact us if you require additional information concerning this event.

Sincerely,

A. J. Cayia
Manager,
Regulatory Services & Licensing

Enclosure

cc: NRC Resident Inspector
NRC Regional Administrator
INPO Support Services
PSCW
NRC Project Manager

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NRC FORM 366 (4-95) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Manual Reactor Trip Due to Decreasing Circulating Water System Fore Bay Level

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
01	21	2000	2000	- 001 -	01	03	22	2000	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	41		20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Charles Wm. Krause, Senior Regulatory Compliance Engineer	(920) 755-6809

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

Unit 1 reactor and turbine were manually tripped from approximately 41% reactor power, at 0239 on January 21, 2000, in accordance with AOP-13A, "Circulating Water System Malfunction" upon the circulating water system pump bay water level having decreased to -11 feet from reference. A rapid load reduction had been initiated in accordance with AOP-17A at 0210 with the pump bay level at -10.5 feet. Circulating water intake crib ice blockage was the cause for the level decrease. With three minor equipment performance exceptions, all equipment operated per design during and following the trip. Initial NRC event notifications were made in accordance with 10 CFR 50.72(b)(1) for a TS required shutdown. A subsequent notification was made for 10 CFR 50.72(b)(2)(ii) for the manual reactor protection system actuation. After inspections to verify structural integrity of the circulating water intake structure and testing to assure operability of the system with two circulating pump operation, Unit 1 was restarted on January 22, 2000, and returned to full power operations at 1930 on January 24, 2000.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

Event Description:

At 0239 CST on January 21, 2000, the Point Beach Nuclear Plant (PBNP) Unit 1 reactor and turbine were manually tripped from approximately 41% power in accordance with the directions of procedure AOP-13A, "Circulating Water (CW) System Malfunction." The circulating water system at PBNP provides water from Lake Michigan to cool the main condensers and also provides the ultimate heat sink via the service water system. The trip was initiated as required by the procedure when the water level measured in the pump bay of the CW pump house decreased to -11 feet with respect to the pump house floor. The apparent cause of the decreasing pump bay water level was partial flow blockage due to icing of the off shore intake structure (intake crib).

Upon initiating the manual reactor trip and turbine trip, the operating crew transitioned to the immediate actions of EOP-0, "Reactor Trip or Safety Injection," then returned to AOP-13A to complete the action steps to SHUT the main steam isolation valves and STOP the one operating CW pump for the tripped unit, followed by EOP-0.1, "Reactor Trip Response." With minor exceptions, all equipment operated as anticipated during and following the trip, resulting in a smooth controlled transition from approximately 41% power to the hot-standby condition. With the main steam stop valves shut, condenser steam dumps were not available so Reactor Coolant System (RCS) temperature was controlled using the steam generator atmospheric steam dumps. RCS temperature fell to a low of approximately 540°F, then returned to the no-load value of 547°F over the next 45-60 minutes. Pressurizer level closely followed RCS temperature and fell to approximately 16% before recovering to a stable value of 20%. The trip from reduced power resulted in steam generator levels trending to a normal hot standby value which did not require actuation of auxiliary feedwater; however, an automatic actuation of AFW did occur due to the AMSAC system actuation (main feed regulation control valve closure on trip) as designed. Pressurizer pressure also trended as expected, dropping from approximately 2020 psi to approximately 1870 psi immediately after the trip with subsequent recovery to 2000 psi.

The exceptions to expected operation consisted of two valve position indication problems, and a failure of the Low Pressure Turbine Oil Lift System to auto start. A valve position indication malfunction for the 'B' Steam Generator Main Steam Isolation Valve, 1MS-2017, occurred, failing to indicate the actual full closed position of the MSIV. The valve was confirmed by local indication to be fully closed. The second valve position problem involved Turbine Drain Valve 1MS-2705, which indicated partially open (full open is expected following the trip). Both valves were inspected and tested and operated correctly during the subsequent start-up.

The Low Pressure Turbine Oil Lift Pumps were manually started as the turbine speed decreased (approximately 220 RPM), versus the expected automatic start at approximately 600 RPM. The failure to auto-start was traced to a design feature which prevents repetitive starting and stopping of the pump on high filter differential pressure. This feature also results in an auto start being blocked if control power is interrupted. The interruption of control power occurred following the last installation of clean suction filters at each oil lift pump when the operator failed to start each lift pump to enable the auto-start feature.

Initial notification of this event to the NRC was provided in an ENS telephone call (event number 36610) at 0320 CST. This was a one hour notification pursuant to 10 CFR 50.72(b)(1)(i)(A) for a Technical Specification (TS) required shutdown to maintain operability of the service water system and in consideration of the license condition commitment to operate the unit in accordance with its service water system analyses and approved procedures. An ENS update was provided at 1239 CST on January 21st. At that time we reported that this event was also reportable pursuant to 10 CFR 50.72(b)(2)(ii) for manual actuation of the reactor protection system. A subsequent engineering analysis demonstrated that the service water system was capable of performing its design function with less than the minimum procedurally required fore bay water level experienced during this event. Although the unit shutdown was procedurally directed (AOP-13A), we concluded that the shutdown was not a TS required shutdown. Accordingly, a second update to the ENS notification was provided on January 24, 2000, which retracted the notification for the TS required shutdown.

On January 21, 2000, an Incident Investigation and Root Cause Evaluation Team was chartered to perform an in-depth review and examination of this event (CR 00-0213).

Cause:

As mentioned above, the immediate proximate cause of this event was a decreasing CW system water level resulting from a partial flow blockage of the off shore intake crib due to surface and frazil ice build up. A description of the CW system is provided in the "Component and System Description" Section of this report. The potential for conditions leading to increased ice formation was recognized during the day on January 20, 2000. Outside air temperatures below 0°F were anticipated later that evening and several of the conditions favorable to the formation of frazil ice as listed in OI-38, "Circulating Water System Operation," (low lake and air temperatures, high lake turbidity, and lack of direct sunlight) were present. The swing shift increased the opening of the ice melt valve at the beginning of their shift to increase the CW inlet temperature to the high end of the OI-38 operating band of 34°F to 38°F. It is likely that the intake crib was already partially frozen at that time and this action was not effective in providing thawing of the crib. An increase in the CW inlet temperature was not observed until approximately four hours later and the lake bottom RTDs continued to be bottomed out at <32°F. At 2012 AOP-13C, "Severe Weather Conditions," was entered when the outside temperature decreased to 0°F. At 2100 a fore bay low level alarm was received at -9 feet and AOP-13A was entered. The operating crews continued to track the lowering fore bay water levels and shifted to full ice melt by shutting the normal discharge valve to increase the recirculation of warm discharge water out to the intake crib. As directed in AOP-13A and OI-70, "Service Water System Operation,", the crew recognized that the minimum permitted level in the pump bay was -11 feet. A decision was made to begin a rapid load reduction on the non-ice melt unit in accordance with AOP-17A if the level decreased to -10' 6". At 0210 this level was reached and a load reduction initiated at a ramp rate of 3% per minute. As discussed in the "Event Description" the unit was manually tripped at 0239 when the level in the pump bay reached -11 feet.

Subsequent to the reactor trip and stopping the Unit 1 circulating water pump, the fore bay level recovered to approximately -6 feet. Over the next several hours, ice melt operations were controlled to limit the inlet temperature to less than 65°F. At about 0630 on the 21st, a further increase in fore bay level and a drop in the CW inlet temperature provided evidence that the intake crib had substantially thawed.

Corrective Actions:

Following this event, the intake crib and the circulating water pump house were inspected on January 21 to determine whether any structural problems or failures had contributed to this event. These inspections included underwater examinations and aerial photography of the intake crib. No structural deficiencies were identified. Following these inspections, a controlled start-up of a second CW pump was completed to verify that operation of two CW pumps was possible with an acceptable and stable fore bay water level.

A temporary change was made to OI-38 to revise the CW inlet temperature control band during ice melt operations and to further define and clarify ice melt operations.

An incident investigation and root cause evaluation (RCE) has been completed. Additional corrective actions to address the root cause and significant contributing factors for this event have been identified, assigned to the appropriate plant groups, and will be managed within the PBNP corrective action program.

Component and System Description:

The circulating water intake system, common to both units, was designed and constructed to provide a reliable supply of Lake Michigan water, regardless of weather or lake conditions, to the suction of four circulating water pumps, six service water pumps and two fire water pumps. The pump house is Class I seismic structure. The intake structure is located 1750 feet from the shore in a water depth of about 22 feet. The structure consists of two annular rings constructed of 12 inch structural steel H pile driven to a minimum depth of 23 feet below lake bed and reinforced with walers fabricated from 12 inch structural steel H pile. The annulus is filled with individually placed limestone blocks having two approximately parallel surfaces and weighing between 3 and 12 tons. The structure has an outside diameter of 110 feet, an inside diameter of 60 feet and a top elevation of +8'-0".

Water enters the structure through the void space between the limestone blocks, through four 6 feet by 6.5 feet contoured concrete pipes in the south half of the structure, and through 30 concrete encased 30 inch corrugated, galvanized steel pipes located around the periphery of the structure and five feet above the lake bed. The outer end of the pipes are normally covered with galvanized bar grating to prevent fish or debris from entering the structure. The grating is removed during the winter season to minimize locations for frazil ice formation. Water flows from the intake structure to the pump house fore bay through two 14 feet diameter, corrugated, galvanized, structural plate pipes buried to a minimum depth of 3 feet below the lake bed. Flow through either of the intake pipes can be reversed during winter operation to re-circulate warm condenser discharge water to the intake to prevent freezing in the system. Water flows from the fore bay through bar grate trash racks and then through travelling screens having 3/8 in. mesh to the suction of the pumps. The circulating water system is periodically treated with sodium hypochlorite to prevent the buildup of slime and algae in the system and to reduce zebra mussel colonization.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Safety Assessment:

As discussed previously in this LER, the plant response during and following the manual reactor trip was essentially as expected. Several minor discrepancies are identified and discussed in the "Event Description." These discrepancies had negligible safety significance. An engineering evaluation of the fore bay water level transient was completed and concluded that the operability of the service water system for both Unit 1 and Unit 2, which remained operating during this event, was not affected by this incident. We have concluded that the health and safety of the public and plant staff was not affected by this event. This event did not involve a safety system functional failure.

System and Component Identifiers:

The Energy Industry Identification System component function identifier for each component/system referred to in this report are as follows:

Component/System	Identifier
Circulating Water Structures	NN
Heat Rejection System	KE
Main Steam System	SB
Turbine Lube Oil System	TD
ESF Actuation System	JE
Service Water System	BI
Indicator, Temperature	TI
Indicator, Level	LI
Reactor	RCT
Turbine	TRB
Circulating Water Pump	P
Circulating Water Isolation Valves	ISV
Filter	F

Similar Occurrences:

A review of recent LERs (past three years) identified no similar events. A review of the past operating experience data base at PBNP identified two significant operating events which resulted in a trip of an operating unit due to freezing related problems with the intake crib structure. These event occurred on January 14, 1976, (SOE 50-301/76-1) and January 10, 1978, (SOE 50-301/78-01). Two additional events were identified which resulted from problems with the control of fore bay water levels but did not result in unit operating transients. These events occurred in February 1977 (SOE 50-266/77-01) and on December 28, 1995 (Condition Report 96-001).